PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in or relating to Load Transfer Apparatus

Communication from CONSOLIDATED IRON-STEEL MANUFACTURING COMPANY, a Corporation organised under the laws of the State of Ohio, United States of America, of 1290 E. 53rd Street, Cleveland, Ohio, United States of America.

I, ARTHUR HAROLD STEVENS, B.Sc., (Lond.), F.C.S., Fellow of the Chartered Institute of Patent Agents, a Subject of the King of Great Britain, of the firm of Stevens, Langner, Parry & Rollinson, of 5/9, Quality Court, Chancery Lane, London, W.C.2, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to load transferring machinery, particularly to machinery for transferring loads from a loading station to a vehicle, or from a vehicle to a loading station; or from one vehicle or station to another.

By the load transferring machinery of this invention, a load on a loading platform or other station may be picked up and deposited on a vehicle bed; or may be picked up from a vehicle bed and deposited at a receiving station; or may be loaded directly upon the transferring machinery and deposited either upon a receiving station or upon a vehicle bed; or may be picked up from one station or one vehicle and deposited upon another; and in the case of formed loads such as a pile of packages which are pre-arranged, the transfer in either case may be accomplished without disturbing the load or the arrangement of the pieces thereof.

The invention will be described in connection with the loading or unloading of a vehicle of the automotive type, but it will be understood that it may be used with other types of vehicles, such for example, as railway cars.

Among the objects of the invention are:

To provide an improved material transferring apparatus;

To provide an improved transfer apparatus for moving loads composed of pieces disposed in a pre-arranged order, from one place to another, without disturbing the arrangement of the pieces;

To provide machinery for picking up loads or articles and for discharging them, having an improved mode of operation;

To provide an improved material handling apparatus which will pick up a load from a loading platform or other station and deposit it upon a vehicle bed; or will pick up a load from a vehicle bed and transfer it to a receiving station; or will transfer to a receiving station or vehicle bed a load which has been placed on the apparatus; or will pick up a load from one station or vehicle and deposit it upon another; the apparatus operating, in either of the said modes of operation, in an improved manner.

According to the present invention there is provided a load transfer apparatus in which a skid or the like carried by a frame is movable on a trackway on said frame to extend over a platform and the trackway is inclined at the end to lower the corresponding end of the skid upon the platform and the skid has a floor movable concurrently with the general movement of the skid but in an opposite direction, said opposing movements being adapted to effect transfer of a load between the skid and platform.

The invention also provides a load transfer apparatus comprising a skid or the like carried by a frame and movable on said frame into engagement with a load on a platform, said skid having a floor adapted to be moved concurrently with and in an opposite direction to the general movement of the skid and at a speed substantially less than the speed of the skid whereby, concurrently with the general movement of the skid, the load will be transferred to the skid and will be compacted by frictional sliding engagement between the moving floor and the under side of the load.

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the speed of the skid, whereby, concurrently with the general movement of the skid, the load will be deposited on the platform and will be compacted by frictional sliding engagement between the moving floor and the underside of the load.

In order that the invention may be clearly understood and readily carried into practice, the same will now be described more fully with reference to the accompanying drawings, in which:

Fig. 1 is a side elevational view of an apparatus embodying the invention;

Figs. 2, 3 and 4 are side elevational views of the embodiment of Fig. 1 drawn to a smaller scale and in simplified form and showing three different positions which the apparatus of Fig. 1 may assume in different phases of its operation;

Fig. 5 is an end elevational, partly sectional view taken from the plane 5—5 of Fig. 1;

Fig. 6 is a view to a greatly enlarged scale of a part of Fig. 1, the parts however being illustrated in the operative position of Fig. 2;

Fig. 7 is a view similar to Fig. 6 of a part of the apparatus of Fig. 1 in the same operative position as shown in Fig. 1;

Fig. 8 is a top plan view of a part of the apparatus of Fig. 1 drawn to a larger scale;

Fig. 9 is an end elevational view with parts broken away and to a larger scale of a truck, forming part of the apparatus of Fig. 1;

Fig. 10 is a top plan view with parts broken away of the truck of Fig. 9, the view being taken approximately in the direction of the arrow 10 of Fig. 9.

Fig. 11 is a view similar to a part of Fig. 1, drawn to a larger scale and illustrating a part of the mechanism of the truck of Fig. 9, the parts all being drawn to a larger scale and showing in detail a locking mechanism which may be employed.

Fig. 12 is a view similar to a part of Fig. 11, illustrating the corresponding parts thereof at the opposite end portion of the embodiment of Fig. 1 and illustrating mechanism parts thereof in different positions from that which they assume in Fig. 11;

Fig. 13 is a sectional view taken approximately from the plane 13—13 of Fig. 11 and showing in solid line, parts which are in Fig. 11 shown in broken line;

Fig. 14 is a fragmentary, sectional view taken from the plane 14—14 of Fig. 12;

Fig. 15 is a diagrammatic representation of an electric control system which may be utilized to operate circuit motors supplying power to various parts of the apparatus illustrated in the above figures;

Fig. 16 is an enlarged fragment of the diagram of Fig. 15;

Fig. 17 is a fragmentary view similar to a part of Fig. 6 near the right hand end thereof illustrating a modification which may be employed;

Fig. 18 is a fragmentary sectional view taken from the plane 18—18 of Fig. 17.

Referring to the drawings, I have shown generally at 1 a frame preferably built up from rolled steel sections, comprising transverse beams 2—2 thereunder adjacent each end thereof; longitudinal frame members 3—3 resting on the beams 2; a pair of upright channel posts 4—4 at one end of the frame (the right end, as viewed in Fig. 1) a corresponding pair of uprights 5—5 at the opposite end of the frame; one or more transverse frame members 6, secured to the uprights; a pair of laterally spaced longitudinally extending channel form rails 7—7; upper longitudinal frame members 8—8 and various brace members 9—9. On each side of the frame is a pair of flanged wheels 10—10, four wheels in all, rotatably supported in bearings 11—11 on the beams 2—2, the pair of wheels 10—10 at each end of the frame rolling on rails 12—12.

To propel the frame along the rails 12—12, the axles of the wheels 10—10 on one side of the frame have gears 13—13 connected thereto meshing with pinions 14—14 on a driving shaft 15 supported in bearings on the underside of the longitudinal frame members 3 and having a gear 16 thereon meshing with a pinion 17 driven by a motor 18 supported on the frame.

By this means when the motor 18 is energized to rotate it in one direction, the frame 1 will be propelled along the rails 12 in one direction and by reversing the motor, the frame may be reversely propelled.

Illustrated generally at 19 (see Figs. 1 and 5) is a load body or skid comprising side walls 20—20 preferably formed from sheet metal and braced by side ribs 21—21; and having a sheet metal bottom 22; the bottom and sides being supported upon longitudinally extending corner angles 23—23; and transverse members 29 of T-section connecting the corner angles.

A plurality of rollers 24—24 extend transversely of the skid adjacent the bottom thereof and relatively close together as shown in Figs. 1 and 8.

The rollers 24—24 in parallel relation are rotatably mounted on the skid. The preferred means is to rotatably support them on shafts 25—25 extending longi-

tudinally through the rollers and secured in the corner angles 23 at opposite ends thereof.

An endless belt 26 is looped over end rollers 27 and 28, both of which are indicated in Figs. 1, 6, 7 and 8, the upper flight of the belt therefore resting upon the upper sides of the rollers 24 and the other flight being thereunder.

To drive the upper belt flight for purposes to be described, the end roller 27 and the roller 24 next adjacent thereto have sprocket wheels 30 and 31 respectively secured thereto and connected by a sprocket chain 32. The said roller 24 is rigidly connected to a shaft (instead of rotating on a shaft 25 as in the case of the other rollers) which has rotary bearing in end castings 34—34 bolted to the corner angles 23—23 and projects therethrough and has mounted thereon exteriorly thereof a sprocket wheel 36.

As will now be apparent, if the sprocket wheel 36 is driven, the sprocket wheel 31 will drive the sprocket wheel 30 which, in turn, will drive the end roller 27 and it will propel the belt, causing the upper flight 26 thereof to move either toward the right or toward the left, as viewed in Fig. 1, depending upon the direction of the application of power.

To thus drive the sprocket wheel 36, a motor 37 is mounted on a suitable bracket on the outside of the skid 19 and by means of speed reduction gears (not shown) in a gear housing 38, drives, at relatively low speed, a sprocket wheel 39 which is connected by a sprocket chain 40 with the said sprocket wheel 36. To this end also the end roller 27 is mounted upon a shaft 41 rotatable in bearings in the end castings 34—34.

The opposite end roller 28 is similarly mounted on a shaft 42 which rotates in bearings 42A in sliding heads 43—43 slidable longitudinally in boxes 44—44 secured to the corner angles 23—23; and means is provided to tension the belt between the two end pulleys comprising bolts 45—45 threaded each in a lug 46 on one of the corner angles 23 and seated in sockets 47 in the sliding heads 43. By turning the bolts 45, the heads 43 will be moved to tension the belt, and to equalize the tension from side to side thereof, as will be understood.

Each end of the skid 19 is normally supported by a pair of wheels 48—48 normally resting upon flat portions 49—49 of trackways 50—50 at each end of the main frame 1 having also inclined trackway portions 51—51, see Fig. 1. The wheels 48—48 are mounted upon the opposite ends of shafts 52—52 which extend across the skid preferably between the belt flights and rotate in bearings 53—53 in castings 54—54 secured to the corner angles 23—23.

As will hereinafter be described, the wheels 48—48 are normally stopped by abutments to cause them to remain on the flat portions 49 of the trackways 50 but when one end of the skid 19 is otherwise supported, the wheels 48—48 of the other end may roll down the inclined portions 51—51 of the trackways 50—50.

The extreme ends of the skid 19 are provided with supporting rollers and an apron, the construction at both ends being substantially the same and one end will now be described.

Shafts 55—55 extend across the skid beyond and adjacent to the end loops of the belt, one shaft (that on the right end as viewed in Fig. 1) being rotatably mounted in bearings 56—56 in the end casting 34 and the other shaft being mounted in bearings 57—57 secured to the corner angles. Rollers 58—58 are mounted on the ends of the shafts and their lowered sides project below the lowest parts of the end portions of the skid. When the end of the skid rests upon a vehicle bed, loading or receiving platform, etc., as will be described in connection with the operation as a whole, the end of the skid will be supported by the rollers 58—58.

On the shaft 55 is a plurality of rollers 59—59 which turn on the shaft. An apron shown generally at 61 is provided, formed from sheet metal and comprising a nose 62 and an upwardly rearwardly inclined portion 63. The nose is bent under as at 64 and has mounted thereon a plurality of apron rollers 65—65 extending in a line transversely across the skid, under the inclined portion 63. The inclined portion 63 is notched out to provide tongue portions 66—66 which extend between the rollers 59—59 and are bent around the shaft 55 whereby the entire apron may oscillate around the shaft and be supported thereby at the rearward portion of the apron.

Intermediate the apron rollers 65, is a transverse series of rollers 67—67 hereinafter referred to as load rollers rotatably mounted on the underside of the inclined portion 63 of the apron and having the upper sides thereof extending upwardly above the apron surface through perforations in the inclined part of the apron, the purpose of which will hereinafter appear in connection with a description of the whole.

The end casting 34 is preferably provided with a sheet metal buffer 69 secured thereto having a vertical edge 70 in a plane slightly in advance of the nose 62 of

the apron and when viewed from above, flaring out laterally as shown at 71, Figs. 8 and 18. The form of this buffer thus tends to guide a load into the skid as will appear later.

Illustrated generally at 72 is a truck, supported by wheels 85—85 on the rails 7—7 and driven therealong in a manner to be described.

The general operation of the skid 19 as thus far described will now be given in connection with the truck 72 and a detailed description of the truck 72 will follow later.

The rails 12—12 are preferably located adjacent to a loading or receiving platform 73 and it will be assumed that it is desired to transfer a pile of packages 74 which are on the platform 73, to the bed 75 of a vehicle. The general arrangement of the parts, in this instance, is that illustrated in Fig. 4. The truck 72 is now operated to raise the end of the skid, the left end as viewed in Figs. 1 and 4, so that the wheels 48 at that end of the skid are raised from the trackway 50 and supported on the truck, the other end of the skid being supported by the wheels 48 at that end resting on the trackways 51. The truck 72 is then operated to move it bodily along the rails 7—7 carrying its end of the skid with it. The wheels 48 on the other end of the skid thereupon roll down the inclines 51—51 of the trackways 50—50 which lowers the roller wheels 58—58 down upon the platform 73.

In the preferred practice of our invention, the load 74, particularly when it consists of a pre-arranged pile of packages is piled on the platform 73 upon a piece of carpet or other like flexible material 187 shown in its normal position at 76, Fig. 4. The farther end of the carpet is secured to the platform as at 188. When the roller wheels 58 are resting upon the platform 73, further movement of the truck 72 may be stopped, momentarily, and the free end of the carpet 76 may be laid upon the apron 61, over and resting upon the upper sides of the load rollers 67 and the free end placed over the rollers 59—59 and downwardly behind and under the end of the belt on the end roller 27.

The rearward movement of the truck above mentioned may now be continued and simultaneously therewith the motor 37 may be energized to move the upper belt flight forwardly, that is to say in the direction opposite to the rearward movement of the skid 19 and the apron 61 thereof. The apron now, so to speak, plows its way under the carpet 76 and when the pile of packages 74 is reached, it lifts them progressively from the forward end to the rearward end of the pile, the carpet rolling freely over the load rollers 67 and the rollers 59, and when the packages have successively passed over the rollers 59 they engage the end of the travelling belt 26 which carries them forwardly into the skid 19 between the walls thereof. This continues until the apron 61 has reached the rear end of the pile and the last packages of the pile have been transferred to the belt in the skid. A continuing forward movement of the belt alone will place the packages midway longitudinally of the skid, if desired, at this time.

At this time, the truck 72 is operated to move back to its original position on the rails 7—7 during which movement the skid is withdrawn from the carpet 187, and the latter by being attached to the platform is ready to have another load of packages piled thereon. The truck 72, after it reaches its end or original position, is operated to lower the skid end again upon the trackway 50. The truck 72 is then moved freely to the other end of its rail 7—7 and is operated to engage the right hand end of the skid and to elevate it above the trackways 50—50 supporting it now on the truck itself. The truck is then operated to move toward the left whereupon the wheels 48—48 at the left end of the skid roll down the inclines 51—51 of the trackways 50—50 which deposits the roller wheels 58—58 upon the bed of the vehicle. Continuing movement of the truck will roll the forward end of the skid over the vehicle bed until it is adjacent to the cab 77 thereof and then its motion is stopped. The truck 72 is then reversed and moves backward along its rails carrying the supported skid end with it and simultaneously therewith, the belt is propelled by the motor 37 forwardly which deposits the packages upon the bed of the vehicle. This completes the cycle of operations, except that the truck 72 which is now at the rear of the main frame is operated to lower the skid upon the trackways 50—50 and to then freely return to the forward end of the frame for other operations.

In a similar manner, if a vehicle load of articles is to be transferred to the station 73, the truck 72 is first moved to the rear of the frame and elevates that end of the skid and then is operated to move toward the left, moving the forward end of the skid unto the vehicle bed, the apron lifting the articles and the belt conveying them backward into the skid; and then the truck 72 is returned to the rear and lowers the rear end of the skid on the frame. The truck 72 is then moved to the forward end of the frame and elevates the forward end of the skid and then moves to

the rearward end of the frame carrying the forward end of the skid with it and moving the rear end of the skid onto the platform; it then withdraws the skid forwardly and the belt floor moves rearwardly which leaves the load on the platform. The unloading operation is the same as that described above except that the station is replaced by the vehicle and the vehicle is replaced by the station. In such cases, of course, it is preferable that the vehicle bed 75 has thereon a piece of carpet or the like upon which the load is placed, at the point at which it was loaded, such carpet being secured to the truck by being secured to the bed at the forward part thereof.

In another mode of operation, the articles may be loaded by hand into the skid while in its normal position on the frame and then when the vehicle is brought to the station, they may load into the vehicle by moving the skid forwardly into the vehicle and then withdrawing it and advancing the upper flight of the belt simultaneously as above described. Again in any case, whenever a load is in the skid, whether being placed there by hand or having been operatively loaded thereinto from a vehicle or from one point of a station, it can be moved along the rails 12—12 to another vehicle or to another station and loaded into either.

As shown in Figs. 2 and 4, the skid may pivot upon the truck 72, the end of the skid opposite the truck therefore being movable vertically up and down. When the end of the skid, as in Fig. 2, rolls down the trackway 51, and the wheels 58 are thereby lowered upon the platform or station 73, the wheels 48 will clear the trackway 51, and the platform 73 and this will be true for various heights of platforms, the inclination and length of the trackway 51 automatically compensating for different heights of platform without further adjusting means.

Furthermore, when the other end of the skid is moved as described toward the vehicle, see Fig. 3, and the wheels 48 roll down the inclined trackway 51 and deposit the roller wheels 58 upon the bed of the vehicle, rolling engagement with the bed will be effected for different heights of vehicle beds; and in this case also, although the bed of any given vehicle may be relatively high when unloaded and gradually descends as the load is transferred thereto, the pivoting of the skid around the truck 72 will not only initially cause the rollers 58 to engage the bed in the first instance but will maintain them in rolling engagement with the bed as it changes its height; and as just described for the other end of the apparatus, no further adjustment or compensating means other than the length and inclination of the trackway on which the wheels 48 roll is needed.

While as described above, the preferred mode of operation involves a piece of carpet or the like attached to the station and another attached to the vehicle bed, the apparatus may operate equally well if the piece of carpet goes with the load. In such cases, the load 74 would be piled upon a piece of carpet 76, say at a station 73 and when the skid apron plows under the carpet to transfer the load to the skid, the free end of the carpet may be allowed to travel upwardly over the rollers and into the skid on the belt flight so that when the load has been transferred to the skid, the carpet will be under the load between the load and the upper flight of the belt.

Then when the apparatus is operated to transfer the load to the vehicle bed, the carpet will be transferred with it and lie between the load and the vehicle bed.

Unloading in such case from the truck will be the same, in general, as unloading from the station and the carpet will travel back into the skid and be delivered again under the load to and upon the station platform.

There are many cases in which the carpet is not essential at all. This will be true when the nature of the packages will permit the apron 61 to slide or plow thereunder without the help of the carpet and is particularly true when the load is placed by hand in the skid and is not loaded thereinto by the apparatus but is only unloaded therefrom, it being clear that the apron can be dispensed with when the skid discharges a load by its movement of the upper belt flight toward the load and the withdrawal of the skid and the belt as a whole from under the load.

As will become more apparent from the electric control system proposed for operating the motor 37 and the motor which operates the truck 72 to move it along the rails 7—7, the speed at which the upper flight of the belt moves may be regulated relative to that at which the truck 72 moves the skid as a whole. For example, when as above described in connection with Fig. 2, the skid is moving toward the load 74 and the upper part of the belt is moving in the other direction to transfer the load from the platform to the belt in the skid, the belt may be caused to run not at the same forward speed as the skid is moving rearwardly but at a slightly lesser speed. By this means, the upper belt flight drags slightly in the rearward direction on the undersides of the undermost packages of the

load thereon which, continuously packs the load and keeps it in order by exerting rearward pressure on the entire pile pressing it back against the wall 78, or against stanchions or the like which may be at the back of the pile. This action tends to maintain the pre-arranged order of the pile of packages and tends to prevent them from becoming misplaced or loosened as a pile, while being loaded. Similarly, but in the reverse sense, when as indicated in Fig. 3, the upper belt flight is moving forwardly and the skid as a whole is moving rearwardly to deposit the packages on the vehicle, the belt flight is caused to move forwardly at a slightly greater velocity than the rearward movement of the skid so that again the belt flight drags on the underside of the undermost packages of the pile and constantly exerts pressure to pack the load against the rear wall 79 of the cab 77, or against stanchions or the like disposed thereat, which maintains the pile solid and compact throughout the unloading process. This is of particular advantage when the load is to be unloaded from the vehicle bed by similar apparatus at another station.

Obviously this same principle may be employed when a load is being unloaded from a vehicle bed instead of from a platform and when it is being delivered to a platform instead of to a vehicle.

The construction and detail operation of the truck 72 above referred to in general will now be described.

The truck (see Figs. 9 and 10), comprises a frame shown generally at 72 of which the principal elements are a pair of lateral channels 80—80, front and rear channels 81—81, transverse pairs of shafts 187—187 are mounted in bearings 84—84 on the frame and have mounted on their opposite ends pairs of flanged wheels, 85—85, four in all, these being the truck wheels referred to above, which run on the rails 7—7 forwardly and rearwardly of the main frame above referred to, carrying the frame of the truck with them.

To propel the wheels, one of the shafts 187 has a gear 86 thereon meshed with a pinion 87 driven through gear reduction means in a casing 88 by a motor 89 supported on the casing, the casing supported on the longitudinal angles 82—82. As will now be clear, by driving the motor 89, the wheels 85—85 will propel the truck forwardly or rearwardly along the rails 7—7.

The wheels 85—85 running on the rails 7—7 may have sprocket wheels 103—103 on the respective shafts 187—187 connected by sprocket chain 104 whereby the motor 89 may drive all of the wheels equally.

Mounted upon the longitudinal angles 83—83 is a frame 90 extending upwardly therefrom on which is mounted a casing 91 containing gear reduction means and to which casing is connected a motor 92, the motor driving the gear reduction means, and the latter having a shaft 93 extending out of the casing driven by the motor.

At each end of the truck frame is a pair of upright angles 94—94 secured to which is a pair of cross angles 95—95, the latter supporting a plate 96 upon which is rotatably abutted one face of a rotatable nut 97 having a sprocket wheel 98 secured thereto. A screw 99 threaded through the nut projects downwardly through a perforation in the plate 96. On the aforesaid shaft 93 is a pair of sprocket wheels 100 and 101 and sprocket chains 102—102 connect the respective sprocket wheels 100 and 101 to the respective sprocket wheels 98—98 on the said screws 99—99.

As will now be apparent when the motor 92 is operated, the nuts 97—97 will be rotated in one direction or the other and the screws 99—99 propelled upwardly or downwardly.

The screws 99—99 are connected respectively each to a plate 105 which is, in turn, connected to the ends of a pair of angle irons 106—106, the angle irons 106 constituting, together with the plate 105, a beam, both ends of which move vertically uniformly with movement of the screws.

The upper ends of the upright angles 94 preferably overlap the outer sides of the angles 106—106 to guide the latter against shifting forwardly and rearwardly of the truck and preferably ears 107—107 on the ends of the angles 106—106 overlap the uprights 94 to guide the said beam against shifting transversely of the truck.

On the underside of the skid 19 adjacent each end thereof is a plate 108 having a notch 109 therein. The above mentioned plate 105 at the upper end of the screw has a tongue 110 adapted to be projected into the notch. The tongue when in the notch thus locks the skid 19 against transverse movement relative to the plate 105 by overlapping upwardly the corner angle 23 of the skid, and locks the skid against longitudinal movement by the engagement of the tongue with the notch.

Thus when, in a manner to be described, the screws are elevated to engage the plate 105 with the underside of the corner angles and therefore with the underside of the skid, the skid is locked against shifting either longitudinally or laterally

on the plate supporting it, and as will now be understood it is the elevation of the screws by which the skid is raised from its trackways 50—51 and supported on the truck 72 for the purposes above described. The raising and lowering of the skid by the screws 99—99 to transfer the skid from its own trackway support to the truck 72 being accomplished by energization of the motor 92.

The skid is furthermore locked to the said plate 105 when the screws are elevated to engage the skid by a latch 111 pivoted on a pin 112 supported upon the angles 106—106 and having a hook 113 at its upper end engageable with the upper side of the plate 108 on the skid when the said beams are raised; the latch being spring pressed by a spring impelled pin 114 reacting at one end upon a connector 115 connecting the ends of the said angles 106—106 to join them into the said beam, and at the other end reacting on a cotter 116 extending through the pin 114, the pin 114 being guided in perforations in a flange of the connector 115 and in a depending lug 117 on the connector, and the inner end of the pin engaging a lug 118 on the latch 111.

The latch also has a lug 119 which when the said beam, and therefore the pivot pin 112 for the latch, is lowered engages the upper end of a post 120 which rocks the hook 113 out of locking engagement to unlock the latch.

The truck 72 is provided with means for locking the wheels 48—48 upon the flat or horizontal portions 49 of the trackways 50—50 and for unlocking them in the operation of the truck and this will now be described.

On the inside of the channel uprights 5—5 adjacent the upper ends thereof, a dog 121 is mounted reciprocable vertically through perforations 122 and 123 in the upper and lower flanges of the trackway 50. The upper extreme end of the dog having an inclined face 124. The dog 121 is normally retained in an upper position in which the upper end portion 125 including the face 124 extends upwardly above the trackway, by a spring 126, surrounding a shank 127 of reduced diameter on the dog below the lower flange 128 of the trackway, the spring abutting at one end upon a shoulder 129 on the dog and at the lower end abutting upon a bracket 130, into a perforation in which, the lower end of the shank 127 projects to guide the plunger. The dog 121 may be stopped in its upward position by the engagement of a washer 131 at the upper end of the spring 126 with the underside of the flange 128 at the trackway.

Upon every occasion when the wheel 48 is rolled up the trackway 50 on the upper flange 132 thereof, (in the operation of the skid, as above described, when the truck 72 returns the skid to its normal position on the main frame), the wheel encounters the face 124 of the dog 121 and pushes the dog downwardly. The dog has a tooth 133 which normally is engaged by a tooth 134 on the arm 135 pivoted at 136 on the bracket 130. The arm 135 is normally resiliently constrained to move clockwise as viewed in the drawing by a plunger 136 reciprocable in brackets 137 and 138 mounted on the trackway 50 and engaging at its inner end a recess 139 in the side of the arm 135 and being resiliently thrust thereinto by a spring 140 abutting at one end upon a part of the bracket 138 and at the other end upon a collar 141 on the plunger 136 and being guided in perforations 142—142 in the bracket. When, therefore, as above described, the dog 121 is depressed by a wheel 48, the tooth 133 is moved downwardly out of engagement with the tooth 134 and the arm 135 is moved toward the right by the plunger 136.

A lock element 143 is pivoted at 144 on the rail 50 and is provided with a notch 145, a camming surface 146, and a wheel engaging prong 147. The locking element 143 is normally retained by gravity in a downward position in which the wheel engaging prong is below the upper edge of the flange 132 of the trackway 50. When however the arm 135 is moved clockwise, as described, the upper end thereof engaging the camming surface 146 rocks the locking element counter clockwise projecting the wheel engaging prong 147 upwardly through a perforation 148 in the flange of the trackway the end of the arm 135 thereupon moving into and being stopped in the notch 145. The parts now take up the position shown in Fig. 12. The operation of the parts just described was effected by rolling of the wheel 48 inwardly along the trackway and the movement of the wheel is now stopped by its engagement with the prong 147, the latter being prevented from yielding by the arm 135 which, as shown, takes up by longitudinal thrust therein on its pivot 136, any force of the wheel 48 tending to rock the prong 147 out of its locked position. Thus upon each return of the skid, as above described, in the operation of the skid to its normal position, it is locked thereat at both ends thereof.

To disengage the lock, to permit the skid to be moved longitudinally by the truck, as above described, the following means is provided to rock the arm 135 counter-clockwise to disengage it from the locking element, and to retract the

plunger 136 and to permit the locking element prong to fall out of the path of the wheel 48. This means comprises a plunger 149 extending through a perforation 150 in the said bracket 137 and having its inner end seated in a recess 151 on the side of the arm 135 opposite the recess 139.

As shown in Fig. 11, upon the truck frame, there are two plungers 149—149, one for release of the said lock at each end of the skid. The plungers 149 are preferably aligned with each other and reciprocable in suitable perforations in a pair of flanges 152—152 supported on a cross flange 153, the inner end portions of the plungers being pivotally connected as at 154—154 to upright bell-crank arms 155—155 pivotally mounted in bearings on the lower side of the cross angle 153 as at 156. The other or horizontal bell-crank arms are pivotally connected, as at 157, to an extension 158 on the lower end of the above described screw 99. By this means when the screw 99 is propelled upwardly, it rocks the upright bell-crank arms 155 to propel the plungers 149—149 outwardly and therefore in the direction to unlock the locking element. It will be observed that the same upward movement of the screw which attached the latch 111 and locked the plate 105 to the skid, in effect locked the end of the skid to the truck so that there is no longer need of the prong 147 locking the wheels 48 to the trackway at that end of the skid.

Thus, supplementing the above description of the operations of the apparatus which was given prior to the description of the truck itself, it may now be said that when the truck motor 92 is operated, the screws 99—99 are propelled upwardly to lock the end of the skid to the truck and to elevate the end of the skid from its trackway supports; then said motor is de-energized and the motor 89 is energized to propel the truck to carry the end of the skid with it in the operation hereinbefore described. Each time that the skid is returned to its normal position over the main frame by the truck 72, the end which is not supported by the truck rolls up the inclined part 51 of the trackway 50 and by engaging the dog 121 thereat on its camming face 124, sets the locking element 143 to lock the wheels 48—48 at that end of the skid so that they cannot roll inwardly on the trackways; further movement of the truck 72 is thereupon stopped. When the truck supported end of the skid is lowered by the truck mechanism, the wheels 48—48 descend upon the upper ends 125 of the dogs 121 and depress them, setting the locking elements 143 at that end of the skid; so that the skid is locked at both ends, locking it against movement in either direction. And as will now be clear when the truck is operated to raise the screws, it must be in a predetermined position under the end portion of the skid whereat it will lock therewith because at any other position longitudinally along the rails 7, it will not release the wheel lock and even if it should be inadvertently operated to raise the skid, it cannot move it longitudinally. Thus these operations are interlocked with each other, for safety and other obviously desired reasons.

To energize the motors 92 and 89 on the truck, current may be led directly from supply mains to a pair of bus bars 160—161 extending longitudinally of the main frame 1, and shoes 162 and 163 on the truck 72 may pick up the current from the motors 92 and 89. But if, as preferred, the traverse of the main frame on the rails 12—12 is employed, bus bars 164 and 165 may be provided under the loading platform 73 and shoes 166 and 167 on the frame may pick up current therefrom and supply it to the said bus bars 160 and 161.

It is deemed unnecessary herein to show the electric conductors on the apparatus by which the electric motors are energized and reversed but the electric circuits therefor are shown in Fig. 15, to which reference may now be made.

Electric current may be supplied to the belt motor 37 by the following means. A pair of contacts 168—168 and a pair of contacts 189—189 are provided on the skid and adjacent to each end thereof and the contacts 168—168 are engageable respectively by a pair of contacts 169—169 on the truck and the contacts 189—189 are engageable by a pair of contacts 190—190 each time that the plate 105 on the truck is elevated. The contacts 169—169 on the truck may be connected to the said bus bar shoes and receive current therefrom through a reversing switch 174; and the contacts 168—168 on the skid may be connected by suitable conductors to the armature of the motor 37. The contacts 190—190 are connected to the shoes 162—163 and when they engage the contacts 189—189, they supply current to the motor field 176 through a rheostat 175. By this arrangement, the truck plate may be elevated at any time to a point at which it will cause the said contacts to engage without actually raising the skid, whereby the belt of the skid may be propelled forwardly or backwardly to position a load thereon independently of truck movement and if the truck plate 105 is elevated far enough to engage the skid bottom, the contacts will still be maintained engaged so that also after the end

of the truck has been elevated, the belt may be propelled in either direction and the belt speed may be controlled by the rheostat 175.

A platform 170 may be provided at any suitable place preferably on the truck 72 upon which an operator may stand and operate an electric controller to perform the above described motor functions.

To position the main frame along the rails 12—12, a reversing switch 171 may be thrown in one direction or the other and the main frame traverse travel motor 18 will receive current from the bus bars 160—161 and the shoes 162—163 thereon and bus bars 164—165 and the shoes 166—167 thereon. When the main frame is thus positioned at the desired station, the switch 172 is thrown to the open position. To operate the screws 99 to raise and lower the plate 105 into or out of engagement with the skid, a reversing switch 172 may be thrown in one direction or the other to operate the truck elevator motor 92 and when this has been done, the switch 172 may be opened. Then to propel the skid along the frame, the reversing switch 173 may be thrown in one direction or the other depending upon which end of the main frame the truck 72 is at, to energize the truck travel motor 89 and when its travel is completed this switch may be opened.

Limit switches 177 and 178 may be provided in the circuit to the main frame travel motor 18 as indicated in Fig. 15 and Fig. 16; to prevent overtravel of the frame on the rails 12—12; and limit switches 179 and 180 may be provided in the circuit to the truck travel motor to prevent overtravel thereof on the rails 7—7 as indicated in Fig. 1; and if desired, limit switches may be provided for the elevator motor to limit the amount of elevation of the skid by that motor if desired, although not shown. The construction of such limit switches comprise no essential part of the present invention and being well known in bridgecrane and other types of motor operated apparatus will be understood by those skilled in this art without further description or illustration. The limit switches 179 and 180 may be set to stop the travel of the truck 72 at each end of its travel at a position at which it unlocks the wheel locks thereat and in a position at which the tongue 109 will engage the recess 110 on the skid and therefore such limit switches are made adjustable as shown in Fig. 16. wherein a switch arm 181 is held in engagement with a contact 182 by a spring 183 and may be moved to disengage the contact by the travel of an element 184 of the truck in which is adjustably screw threaded a screw 185, the end of which abuts upon the switch arm 181 at the end of the travel to operate it, as described.

Whereas I have illustrated the invention as having motors operated by a two-line, direct current circuit, it will be understood by those skilled in the art that they may be alternating current motors and operated by alternating current.

If the skid 19 should be propelled bodily by the truck 72 unintentionally or by accident on an occasion when there was no station 73 or vehicle bed 75 to support the overhanging end of the skid, the wheels 48 would otherwise roll off of the ends of the trackway 51. To prevent such misfunctioning, a wheel 186 is mounted on suitable bearings at each corner of the main frame and directly under the corner angles 23 of the skid, and the corner angles will descend upon said wheels when the wheels 48 leave the trackway 51 and therefore the wheels 186 will support the end of the skid.

It will be understood that the switches 171, 172, 173, and 174, and the rheostat 175 may all be mounted on a suitable panel or embodied in a suitable controller operable by an operator standing on the platform 170, such controllers and mountings being well known and not necessary of further illustration or description herein.

In some cases, when the skid is moved to pick up a load either from a platform or from a vehicle bed, it may be desireable to provide the buffer 69 above described at the end of the skid with one or more rollers, to further and more easily guide the load into the skid. In Figs. 17 and 18, is illustrated a roller 186, projecting through a suitable aperture in the buffer 69, the roller 186 rotating on a short shaft 187, the ends of the shaft outwardly beyond the roller being, in the construction illustrated, welded to the inner side of the buffer 69.

It will be understood, of course, without further drawing or description to complicate this disclosure, that the rollers 186, as well as the rollers 59—59 and 65—65, may if desired, be driven by power.

My invention is not limited to the exact details of construction illustrated and described. Many changes and modifications may be made within the spirit of my invention without sacrificing its advantages and within the scope of the appended claims.

Having now particularly described and ascertained the nature of my said invention (as communicated to me by my foreign correspondents), and in what manner the same is to be performed, I

declare that what I claim is:—

1. A load transfer apparatus in which a skid or the like carried by a frame is movable on a trackway on said frame to extend over a platform and the trackway is inclined at the end to lower the corresponding end of the skid upon the platform and the skid has a floor movable concurrently with the general movement of the skid but in an opposite direction, said opposing movements being adapted to effect transfer of a load between the skid and platform.

2. A load transfer apparatus comprising a skid or the like carried by a frame and movable on said frame into engagement with a load on a platform, said skid having a floor adapted to be moved concurrently with and in an opposite direction to the general movement of the skid and at a speed substantially less than the speed of the skid whereby, concurrently with the general movement of the skid, the load will be transferred to the skid and will be compacted by frictional sliding engagement between the moving floor and the under side of the load.

3. A load transfer apparatus comprising a skid or the like carried by a frame and movable on said frame to deposit a load on a platform, said skid having a floor adapted to be moved concurrently with and in an opposite direction to the general movement of the skid and at a speed substantially greater than the speed of the skid, whereby, concurrently with the general movement of the skid, the load will be deposited on the platform and will be compacted by frictional sliding engagement between the moving floor and the under side of the load.

4. A load transfer apparatus according to any one of the preceding claims, in which the frame is adapted to be bodily moved laterally to dispose the skid opposite any one of a plurality of transfer stations.

5. A load transfer apparatus according to any one of the preceding claims, in which the frame is provided with a trackway having horizontal and declining portions for supporting a wheel provided on the skid, and having an abutment mechanism operable by the wheel to prevent rolling of the wheel beyond the horizontal portion of the track-way.

6. A load transfer apparatus according to any one of the preceding claims, in which a truck movably mounted on the frame is adapted to elevate one end of the skid and then to move said skid relatively to the frame.

7. A load transfer apparatus according to claim 6, in which the truck includes an element movable upwardly to engage the skid and associated means for locking said element with the skid to prevent relative displacement thereof when the skid is in elevated position.

8. A load transfer apparatus according to claims 5 and 6 or 5 and 7, in which the abutment adjacent the elevated end of the skid is removed by the elevating operation.

9. A load transfer apparatus according to claim 8, in which the wheel of the skid effects restoration of the abutment upon lowering of the skid by the truck.

10. A load transfer apparatus according to any one of the preceding claims, in which a self-adjusting apron mechanism is provided at one or both of the ends of the floor of the skid, said mechanism comprising an apron element hinged to the skid and having a downwardly inclined upper surface with one or more rollers mounted thereunder, and also one or more rollers mounted thereon and projecting upwardly therefrom, said apron also preferably having one or more rollers supported at the horizontal axis thereof.

11. A load transfer apparatus according to claim 10, in which an opening is provided between the apron and the end of the floor through which opening the end of a strip of flexible material (such as a carpet used to facilitate loading) may project downwardly.

12. A load transfer apparatus having its parts constructed, arranged and adapted to operate substantially as hereinbefore described with reference to the accompanying drawings and for the purpose specified.

Dated this 19th day of July, 1938.

For: ARTHUR HAROLD STEVENS,
Stevens, Langner, Parry & Rollinson,
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5/9, Quality Court Chancery Lane,
London, W.C.2, and at
120, East 41st Street, New York,
U.S.A.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1939.

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FIG. 1.

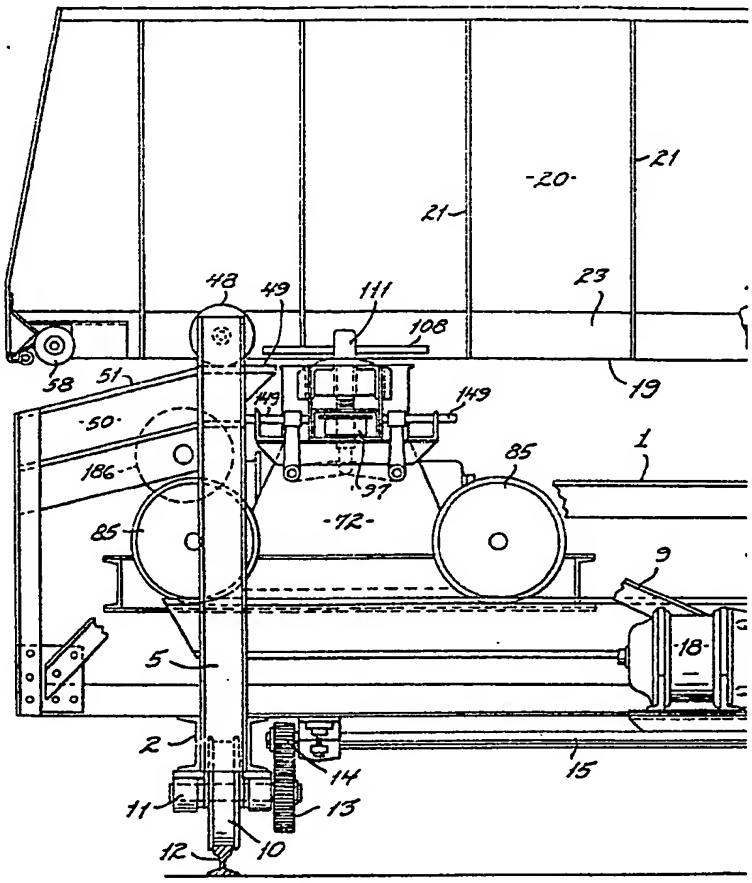

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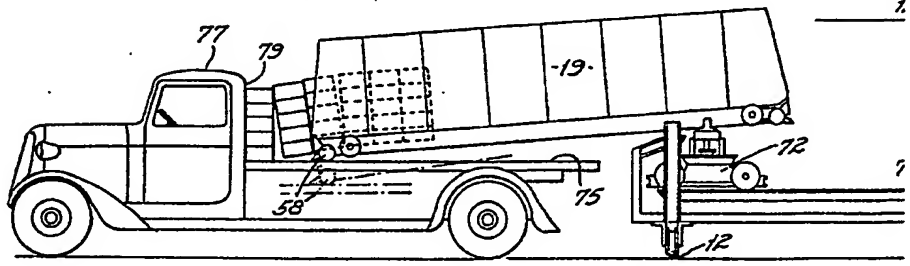
FIG. 3.



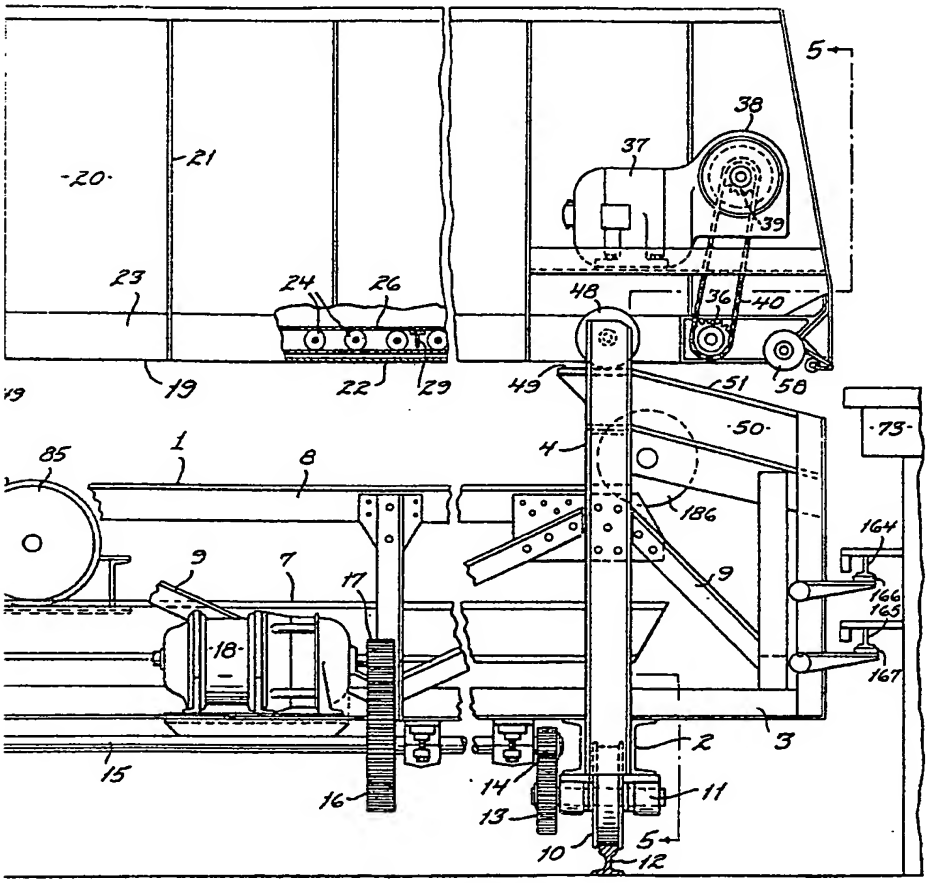

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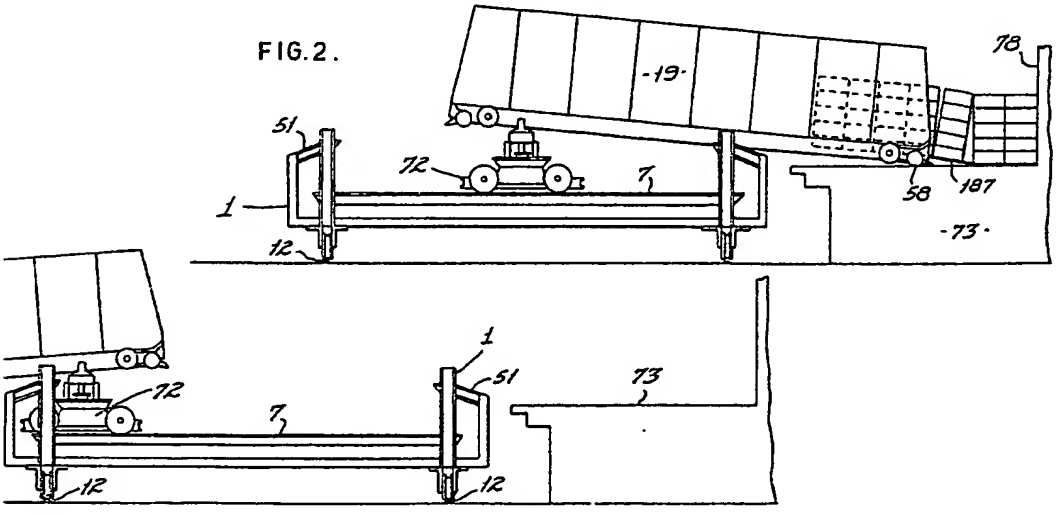
FIG. 2.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506,236 COMPLETE SPECIFICATION

6 SHEETS
SHEET 1

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FIG. 1.

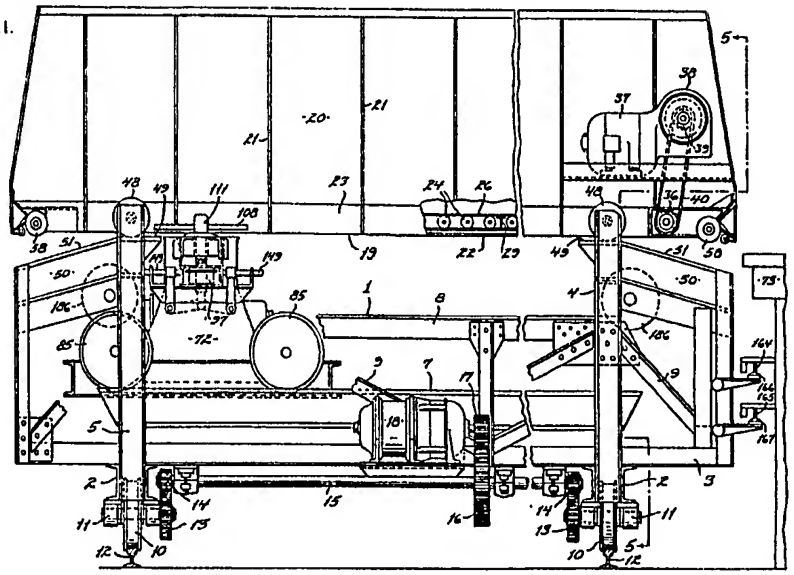

FIG. 2.

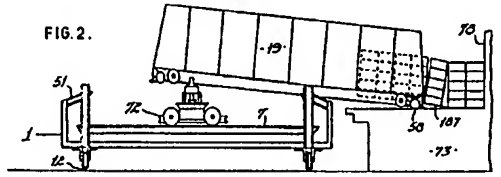

FIG. 3.

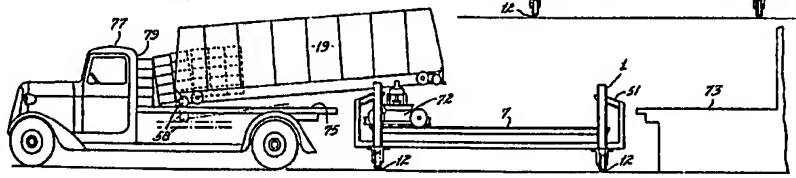

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FIG. 5.

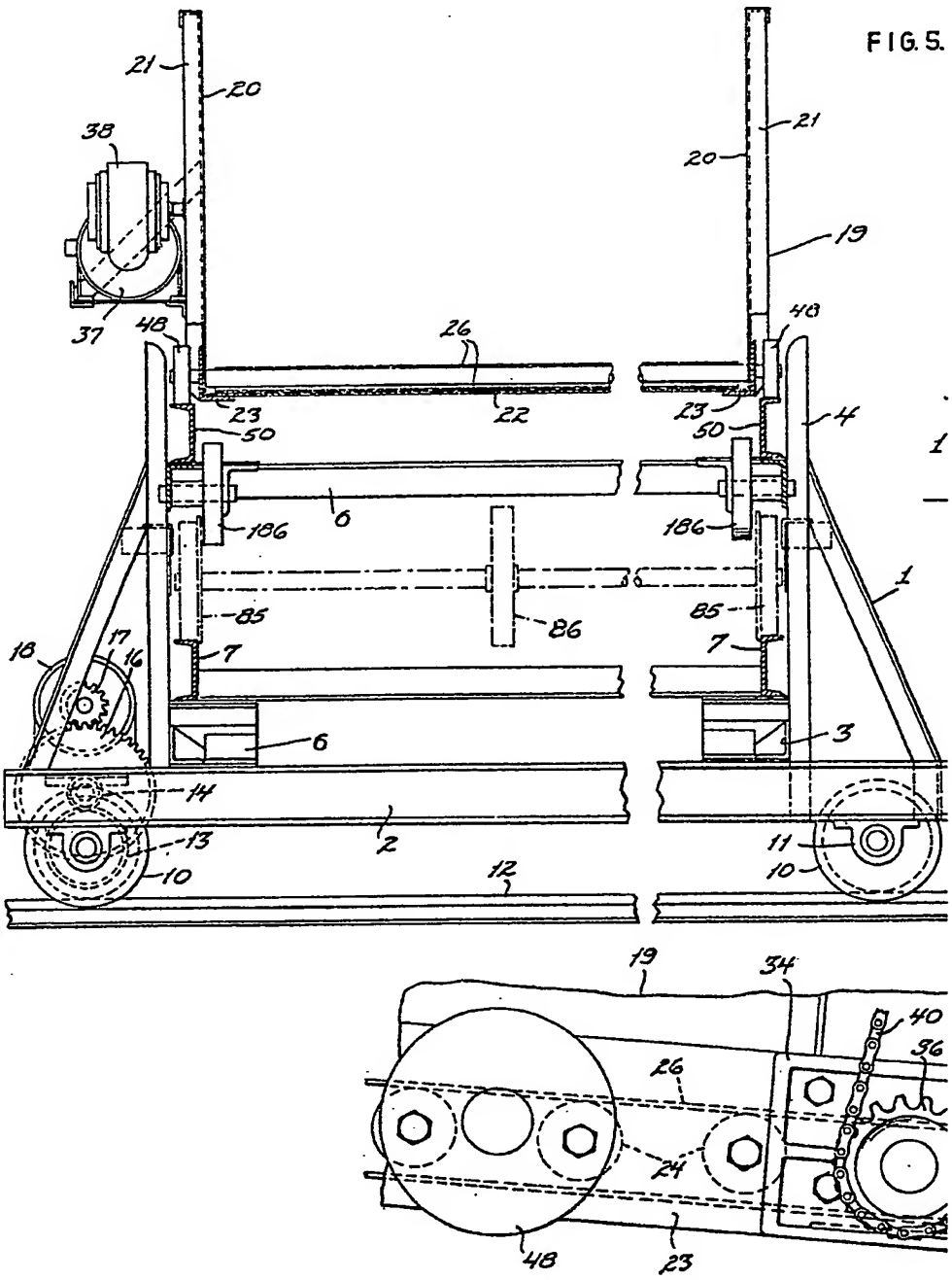


FIG. 5.

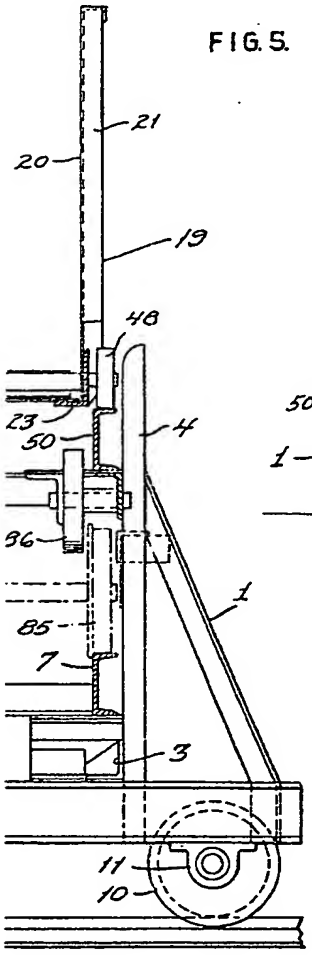


FIG. 4.

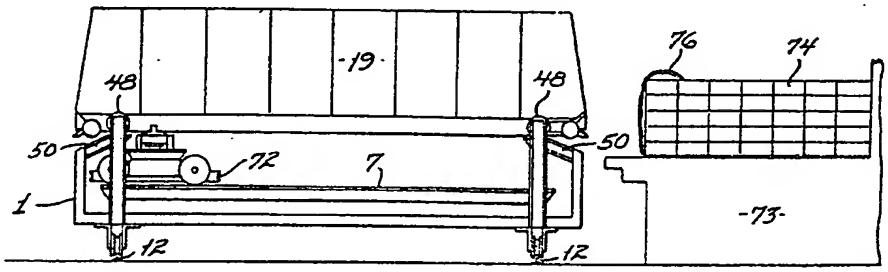
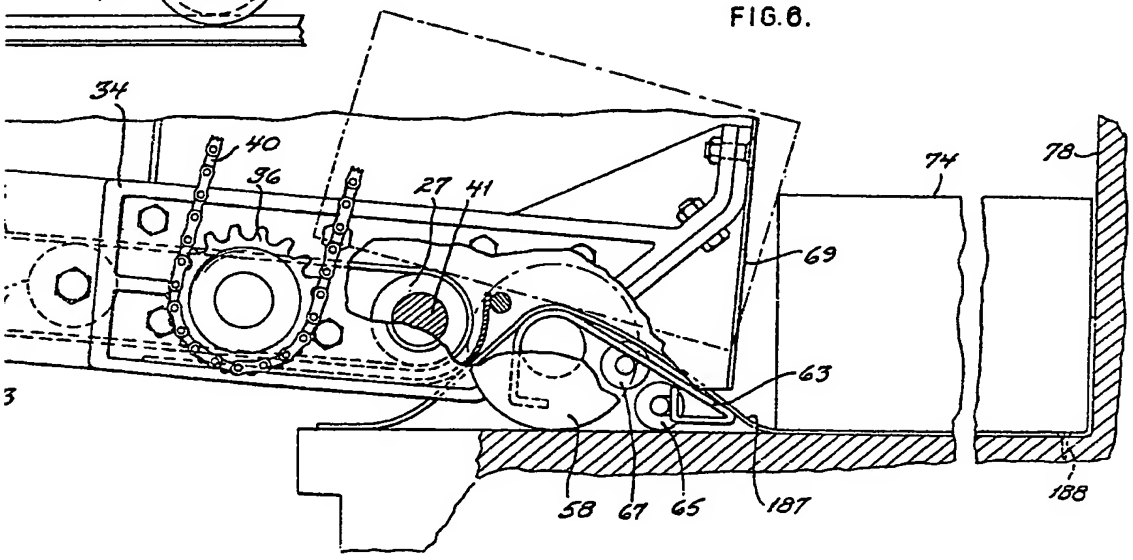


FIG. 6.



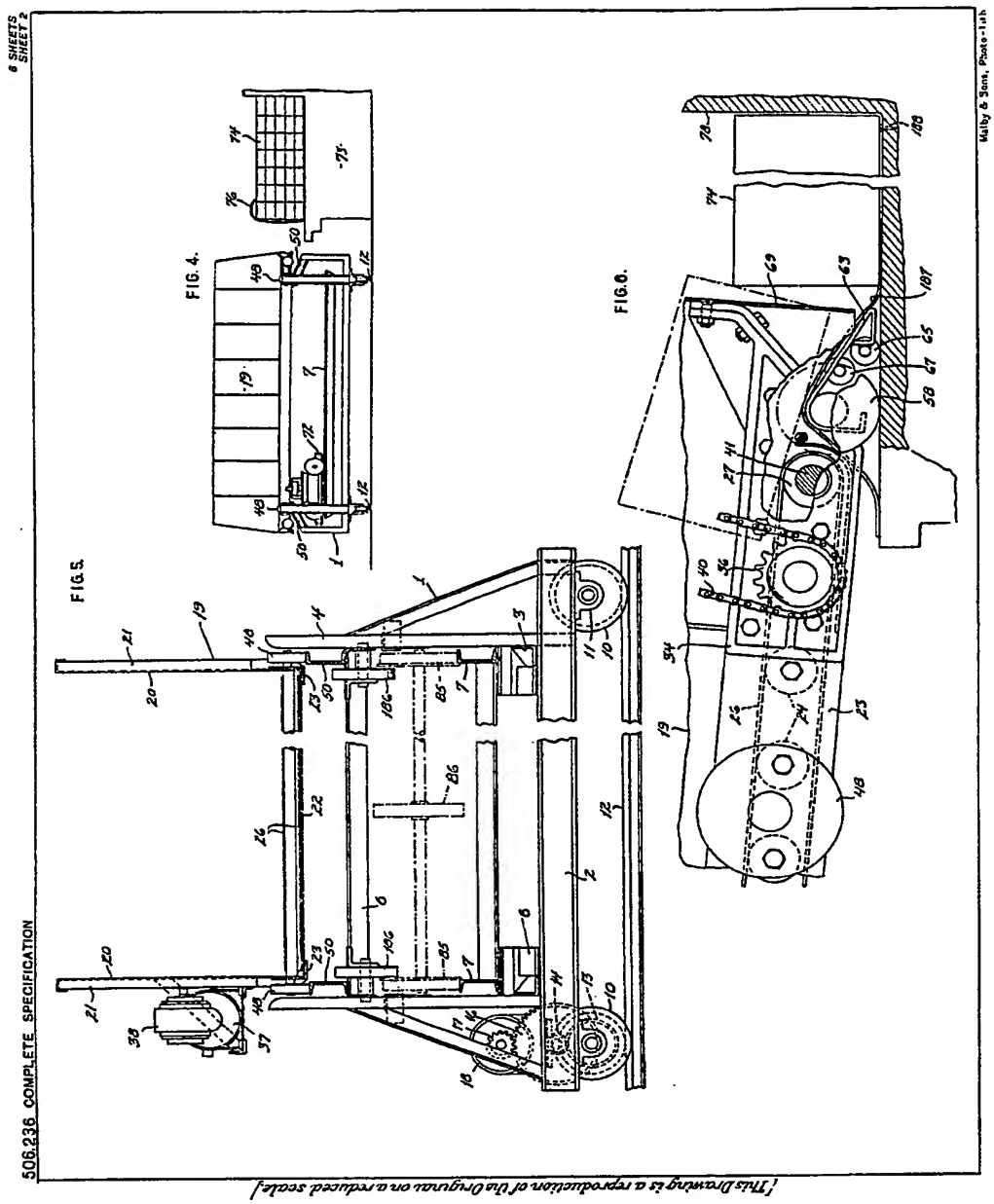


FIG. 4.

FIG. 5.

FIG. 6.

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FIG.7.

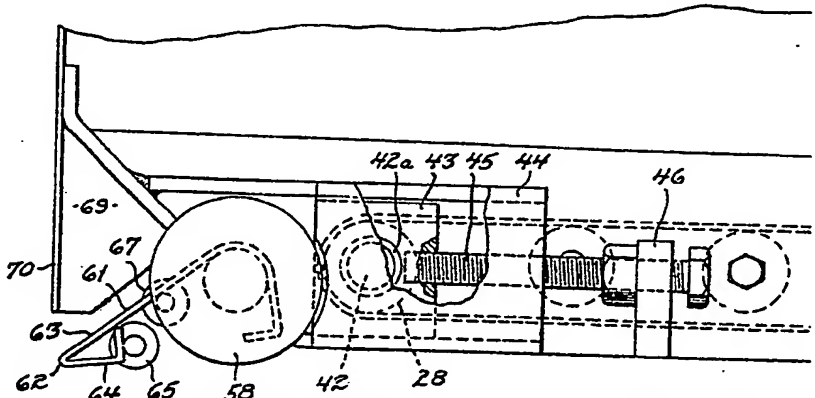
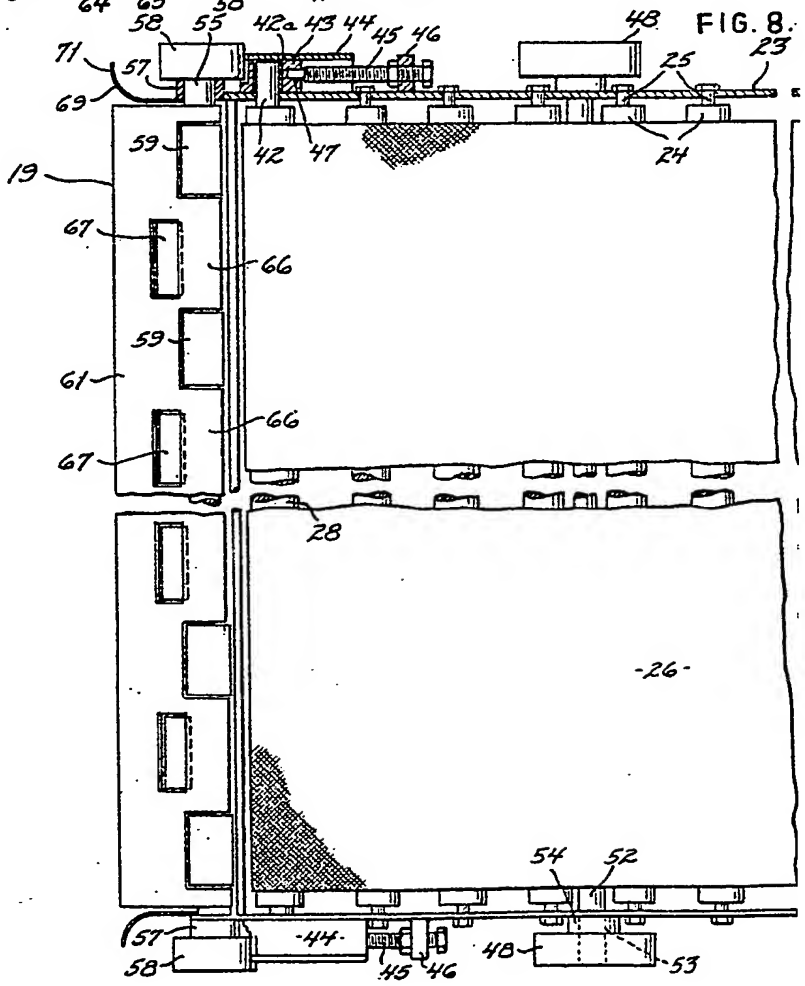


FIG. 8.



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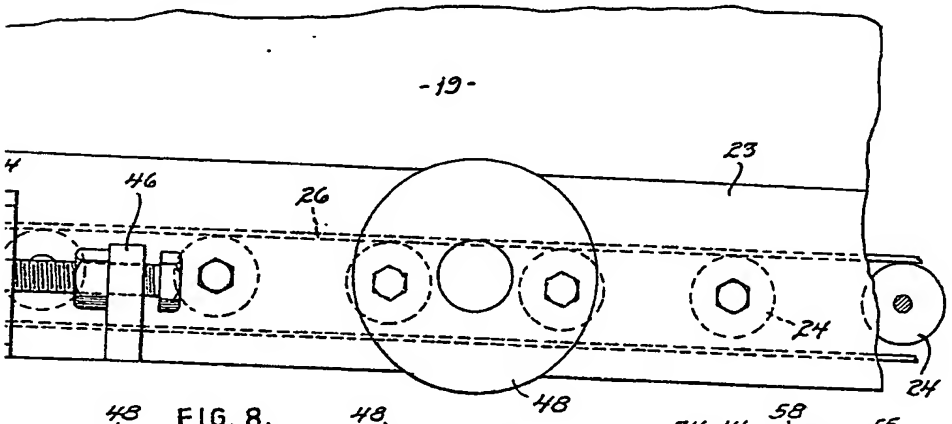
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FIG. 8.

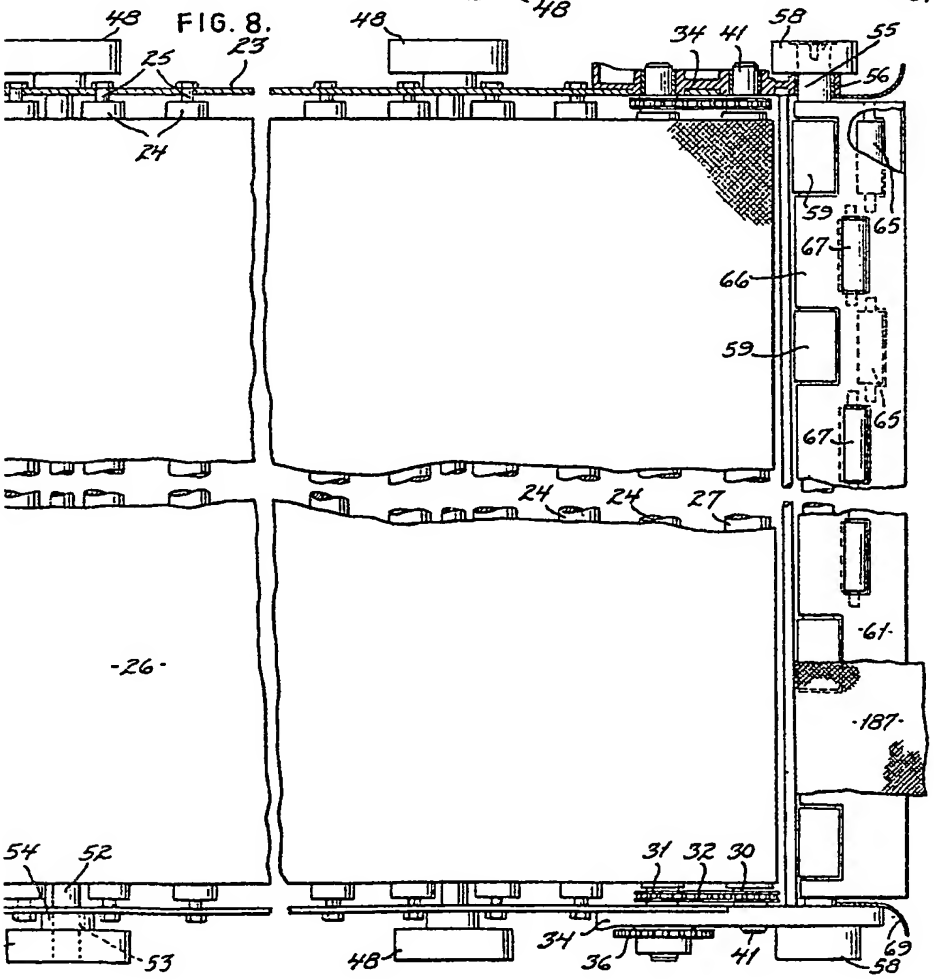
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FIG. 7.

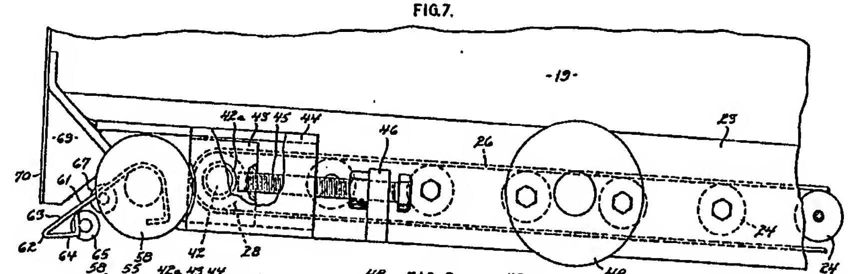

FIG. 8.

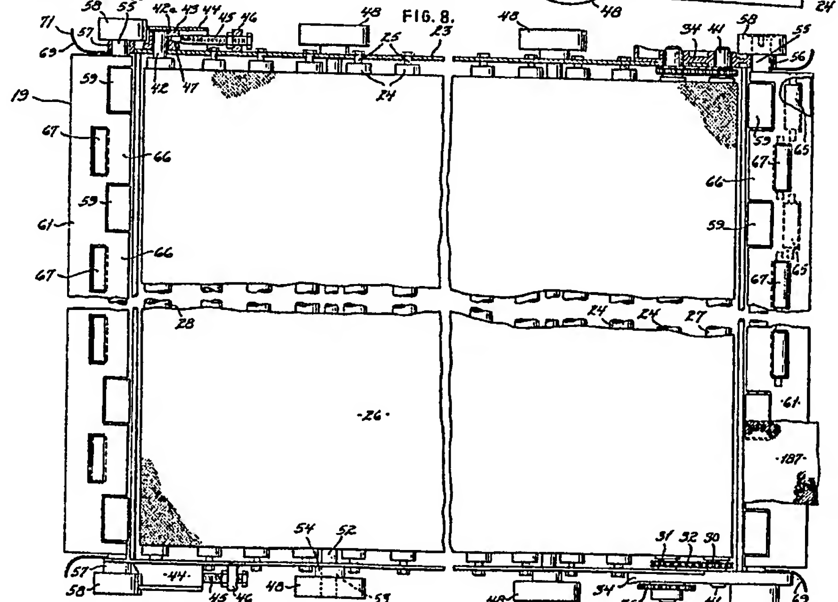

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FIG.9.

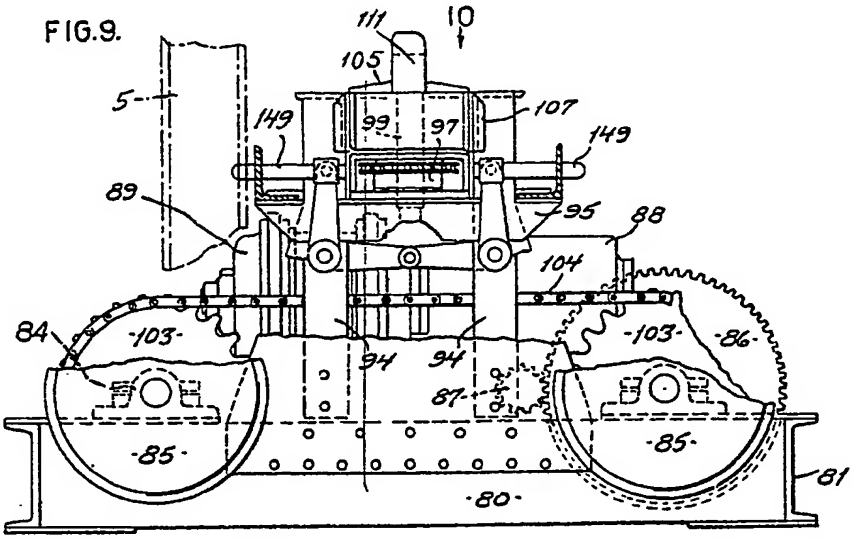

FIG.11.

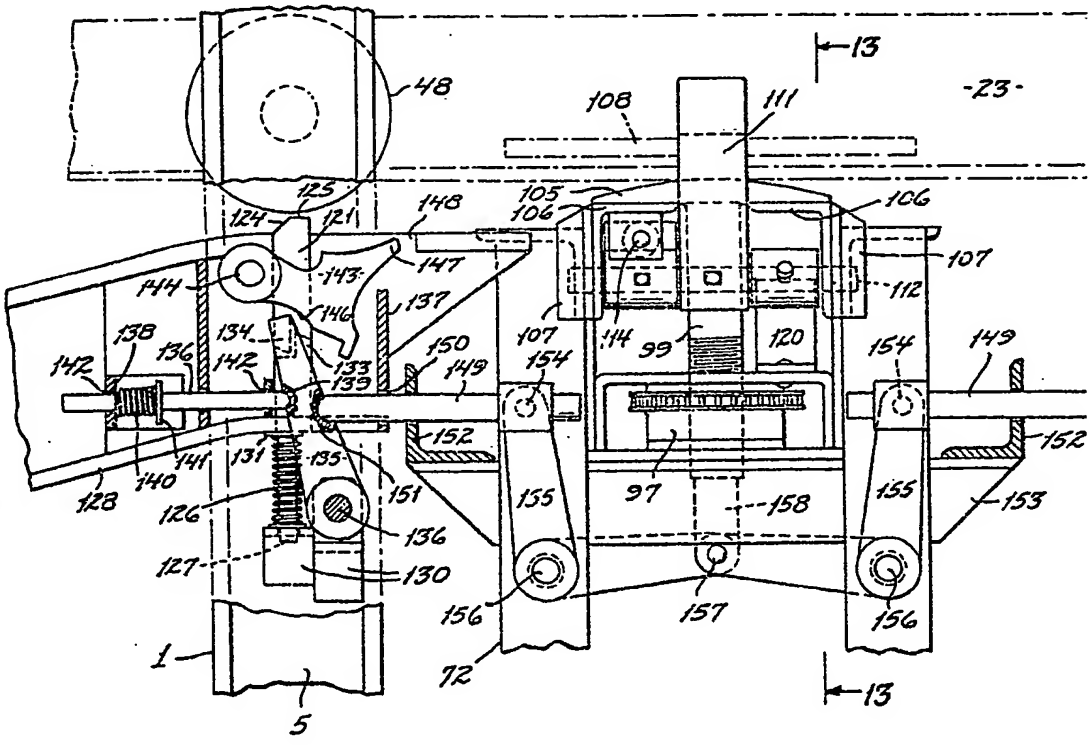

FIG. 10.

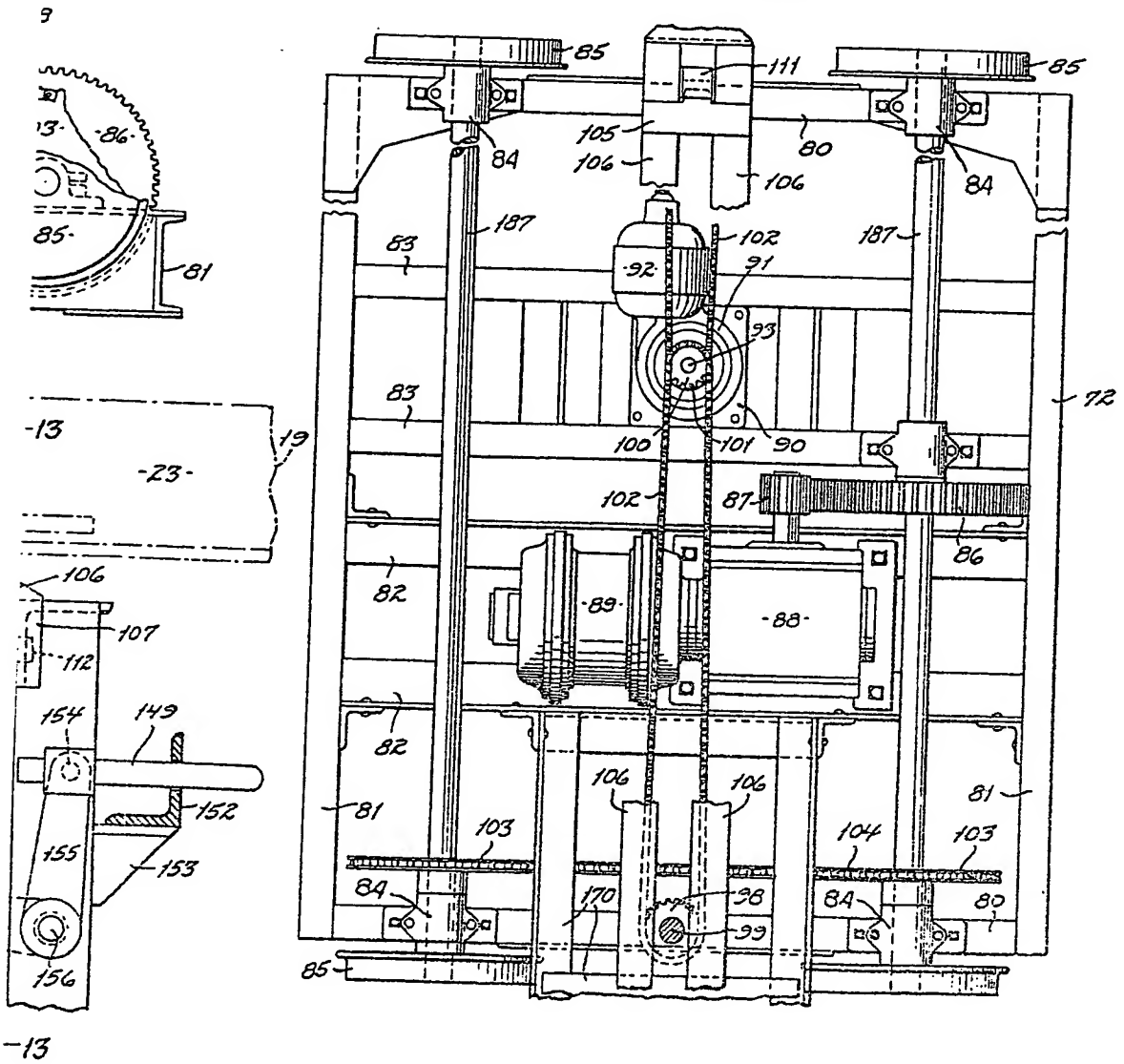

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FIG. 9.

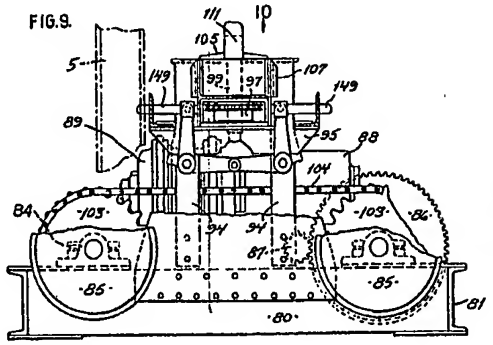


FIG. 10.

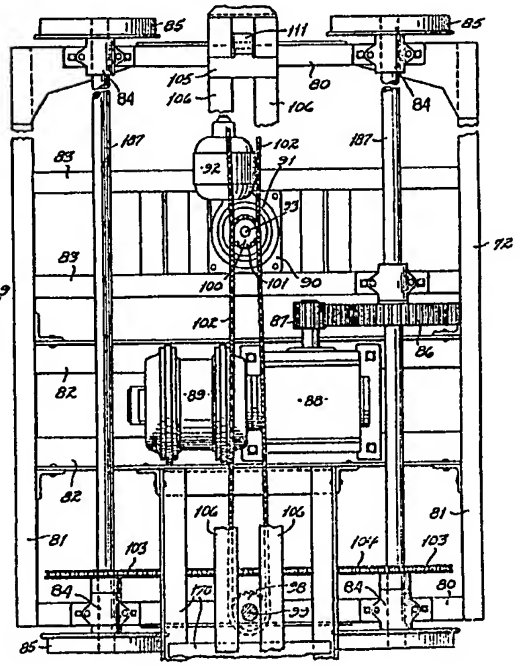
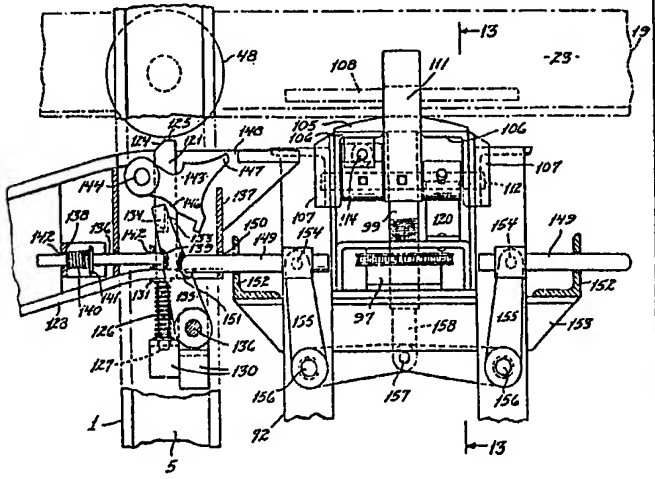


FIG. 11.



Wells, & Sons, Ltd.

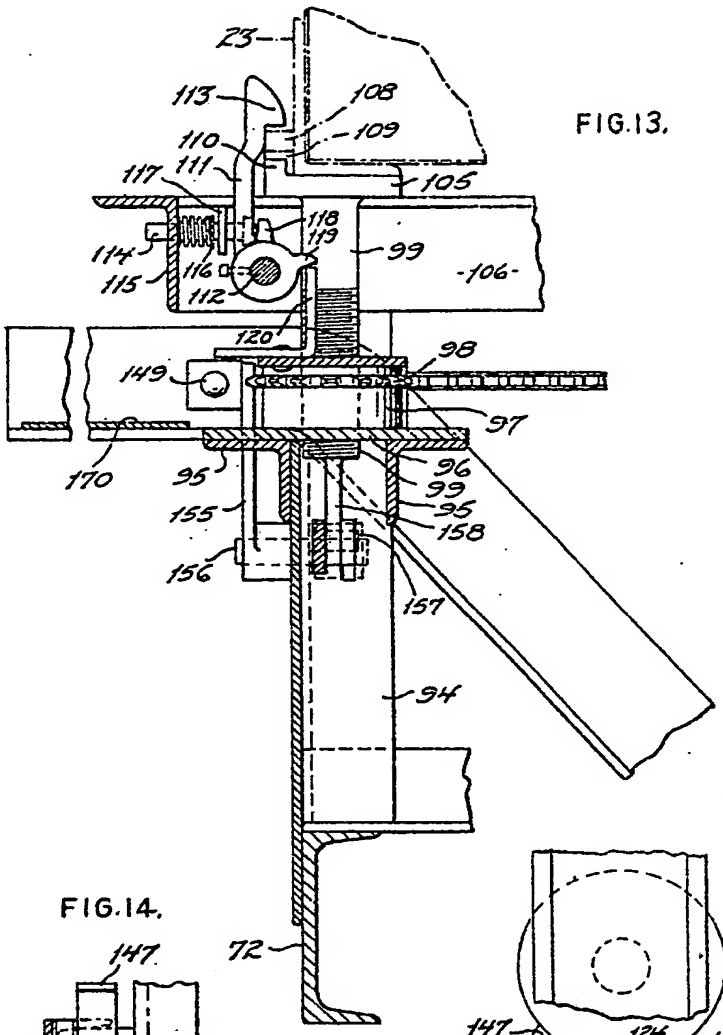
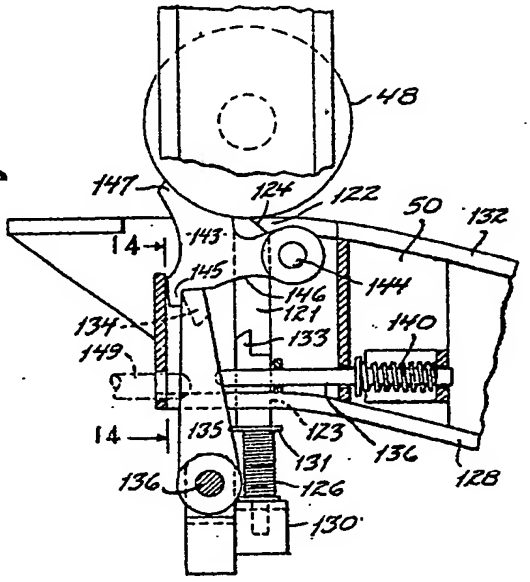


FIG.13.

FIG.12.



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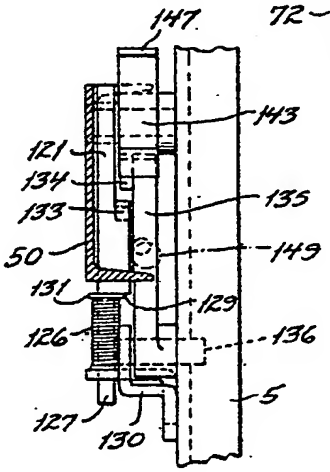

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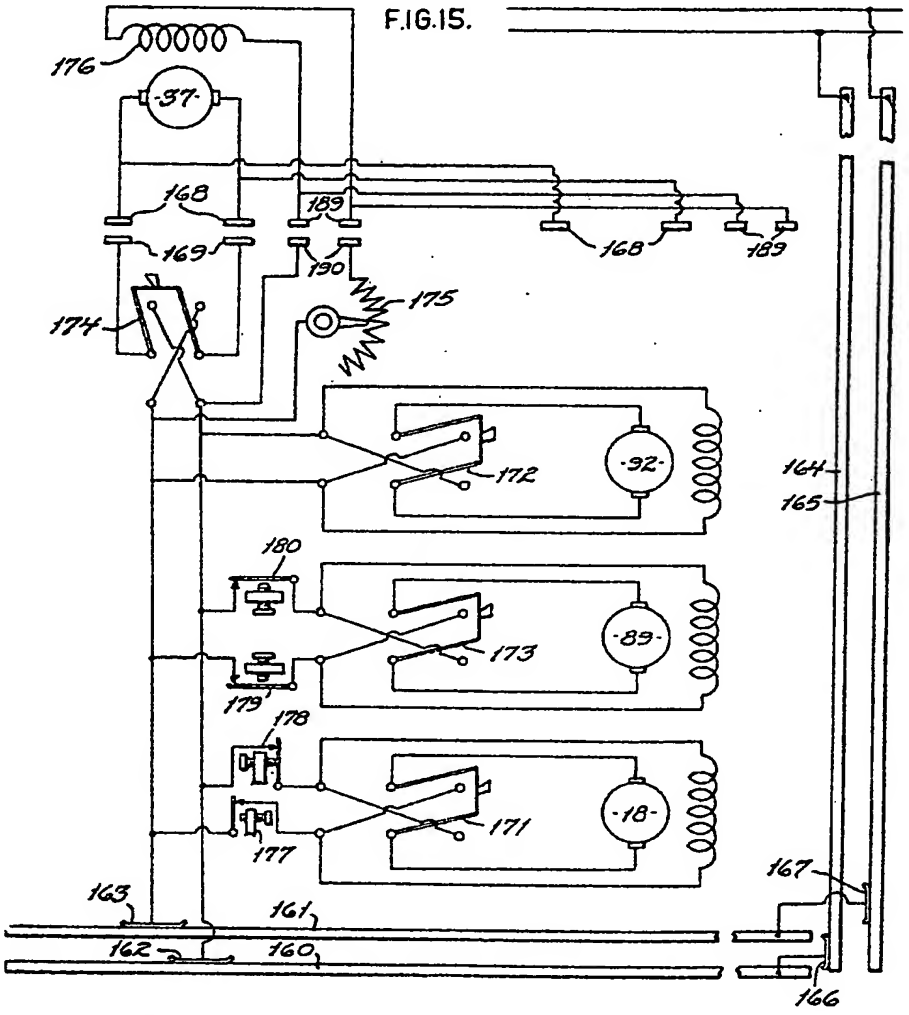

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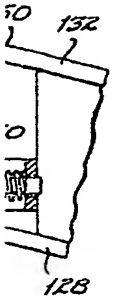
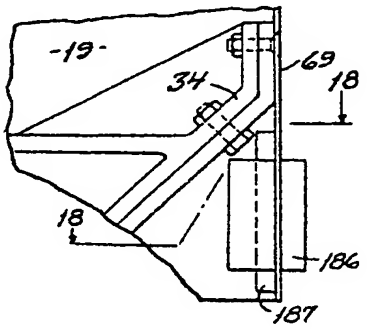


FIG. 17



F16.16.

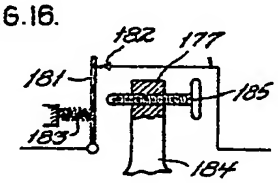
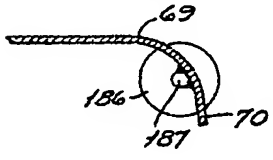


FIG. 18



506,236 COMPLETE SPECIFICATION

6 SHEETS

SHEET 5

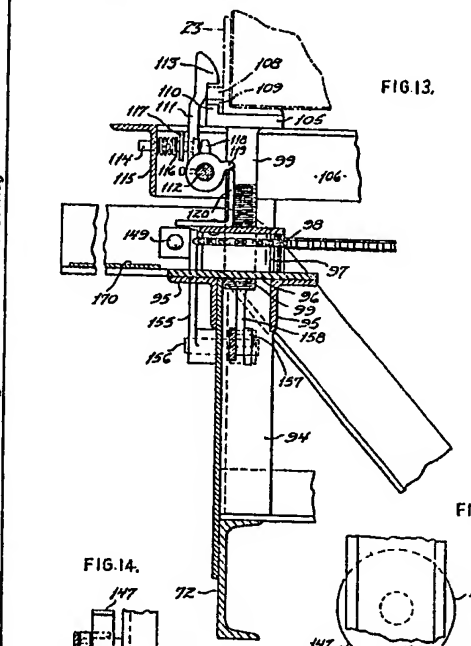


FIG.13.

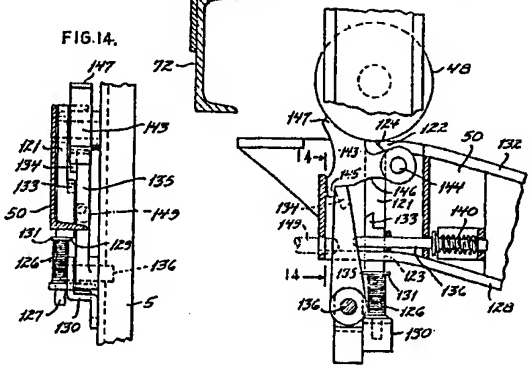


FIG.12.

FIG.14.

SHEET 6

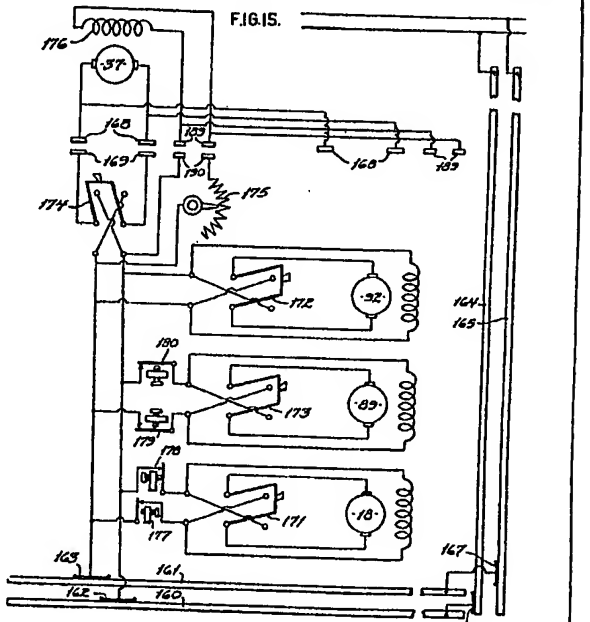


FIG.15.

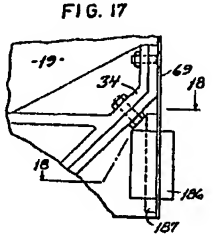


FIG. 17

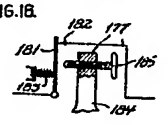


FIG.18.

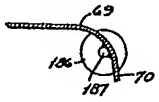


FIG. 18

[This Drawing is a reproduction of the Original on a reduced scale.]

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